

IN THE CLAIMS:

Claims 1 through 20 were previously cancelled. Claims 29 through 41 are being cancelled herein. All of the pending claims 1 through 41 are presented below. This listing of claims will replace all prior versions and listings in the application. Please enter these claims as amended.

Listing of Claims:

1.-20. (Cancelled)

21. (Currently amended) A diode on a silicon substrate, comprising:

an active region in the silicon substrate, the active region being heavily doped with a first type dopant;

a refractory metal silicide layer contacting and covering at least a portion of the active region;

an insulation layer contacting and covering at least a portion of the first refractory metal silicide layer, the insulation layer having a diode opening extending therethrough and communicating with the first refractory metal ~~silicide~~ silicide layer;

a polysilicon plug disposed within the diode opening and contacting the first refractory metal silicide layer, the polysilicon plug comprising:

a bottom portion in contact with the first refractory metal silicide layer and being lightly doped with the first conductivity type dopant, and

a top portion in contact with the bottom portion; and

a material that is capable of changing states and resistivities vertically over and in communication with the polysilicon plug.

22. (Currently amended) ~~A~~ The diode as defined in claim ~~22~~, 21, wherein the material that is capable of changing states and resistivities comprises a programmable resistor, the diode further comprising a metal contact vertically over and in communication with the programmable resistor.

23. (Currently amended) ~~A~~ The diode as recited in claim 22, wherein the programmable resistor comprises at least one layer comprised of a memory material selected from the group consisting of ovonic and chalcogenide materials.

24. (Currently amended) ~~A~~ The diode as defined in claim 22, wherein the programmable resistor further comprises at least one barrier layer.

25. (Currently amended) ~~A~~ The diode as defined in claim 24, wherein ~~said~~ the at least one barrier layer comprises titanium nitride.

26. (Currently amended) ~~A~~ The diode as defined in claim ~~22~~, 21, wherein the diode opening has a width in a range between about 0.3 microns to about 0.8 microns.

27. (Currently amended) ~~A~~ The diode as defined in claim ~~22~~, 21, further comprising a continuous second refractory metal silicide layer positioned between the polysilicon plug and the first refractory metal silicide layer and also between the polysilicon plug and the insulation layer.

28. (Currently amended) ~~A~~ The diode as defined in claim 27, wherein the second refractory metal silicide layer is made of a refractory metal silicide selected from a group consisting of: titanium silicide, tungsten silicide, tantalum ~~silicide~~, silicide, cobalt silicide, and molybdenum silicide.

29. (Withdrawn and Previously presented) A diode on a silicon substrate, comprising:

a silicon substrate lightly doped with a first conductivity type dopant;

an oxide layer overlaying the silicon substrate, the oxide layer having a top surface and defining a hole which extends through the oxide layer and communicates with a portion of the silicon substrate;

a polysilicon plug positioned within the hole in the oxide layer, the polysilicon plug being doped with a second conductivity type dopant opposite the first conductivity type dopant;

an active region formed in the silicon substrate below the polysilicon plug, the active region being doped with the second conductivity type dopant received from the polysilicon plug; and

a material that is capable of changing states and resistivities vertically over and in communication with the polysilicon plug.

30. (Withdrawn and Currently amended) ~~A- The~~ diode as defined in claim 29, wherein the oxide layer defines a channel that extends from the top surface of the oxide layer to the top surface of the polysilicon plug, the polysilicon plug having a top surface that is below the top surface of the oxide layer.

31. (Withdrawn and Currently amended) ~~A- The~~ diode as defined in claim 29, wherein the polysilicon plug is at least partially encased by the oxide layer;

32. (Withdrawn and Currently amended) ~~A- The~~ diode as defined in claim 29, wherein the material that is capable of changing states and resistivities comprises a programmable resistor, the diode further comprising a metal contact vertically over and in communication with the programmable resistor.

33. (Withdrawn and Currently amended) ~~A~~ The diode as recited in claim 32, wherein the programmable resistor comprises at least one layer comprised of a memory material selected from the group consisting of ovonic and chalcogenide materials.

34. (Withdrawn and Currently amended) ~~A~~ The diode as recited in claim 32, wherein the programmable resistor further comprises at least one barrier layer formed of titanium nitride.

35. (Withdrawn and Currently amended) A diode on a silicon wafer, comprising:
an active region in a silicon wafer, the active region being heavily doped with a first conductivity type dopant;
a first refractory metal silicide layer contacting and covering at least a portion of the active region;
an insulation layer contacting and covering at least a portion of the first refractory metal silicide layer, the insulation layer having a diode opening defined by an interior surface extending through the insulation layer and communicating with the first refractory metal silicide layer;
a second refractory metal silicide layer lining the interior surface of the diode opening so as to contact the first refractory metal silicide layer;
a polysilicon plug within the diode opening, the polysilicon plug being lightly doped with the first conductivity type dopant;
a platinum silicide layer contacting the polysilicon plug and separated from the second refractory metal silicide layer;
an insulative silicon layer overlying the diode opening, the insulative silicon layer having a passageway extending therethrough and communicating with the platinum silicide layer; and
a layer of a material that is capable of changing states and resistivities ~~material~~ over the insulative silicon layer, within the passageway, and contacting the platinum ~~silicide~~ silicide layer.

36. (Withdrawn and Currently amended) ~~A~~ The diode as defined in claim 35, further comprising:

a metal contact in contact with the material that is capable of changing states and resistivities.

37. (Withdrawn and Currently amended) ~~A~~ The diode as defined in claim 35, wherein the material that is capable of changing states and resistivities comprises a programmable resistor.

38. (Withdrawn and Currently amended) ~~A~~ The diode as recited in claim 37, wherein the programmable resistor comprises at least one layer comprised of a memory material selected from the group consisting of ovonic and chalcogenide materials.

39. (Withdrawn and Currently amended) ~~A~~ The diode as defined in claim 37, wherein the programmable resistor further comprises at least one barrier layer.

40. (Withdrawn and Currently amended) ~~A~~ The diode as defined in claim 39, wherein the at least one barrier layer comprises titanium nitride.

41. (Withdrawn and Currently amended) ~~A~~ The diode as defined in claim 35, wherein the polysilicon plug comprises polysilicon having an average grain size diameter in a range between about 0.3 microns to about 0.8 microns.